

Two cases of aortic emergency presenting with neurologic manifestations, aided by POCUS

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Abstract

Acute aortic dissection and aneurysm are lethal vascular emergencies and may present with various clinical presentations including neurological manifestation. Thus, the diagnosis of aortic dissection and aneurysm can be challenging as it may mimic other disorders whereby misdiagnosis can be fatal. In district general hospitals where advanced radiological modalities are not widely available, Point of Care Ultrasound (POCUS) is a tool to diagnose aortic dissection and aneurysm rapidly and accurately. The first case was a 60-year old, Chinese gentleman presented with alternating conscious level. He had a history of syncope that was precipitated by shortness of breath. On examination, his initial GCS was E1, V3, M5 but he regained full consciousness when we laid him supine for intubation. He complained of severe tearing chest pain. He demonstrated radio-radial and radio-femoral delays. Chest X ray showed mediastinal widening, and bedside echocardiography revealed aortic root dilatation with intimal flaps. Patient was sent to a tertiary centre for Computed Tomography of Aorta that confirmed the diagnosis, and vascular repair was planned. The second case was a 70-year old, Malay gentleman presented with recurrent tonic-clonic seizure. On examination, there was a palpable pulsatile mass over epigastric and umbilical region. Bedside ultrasound revealed aortic aneurysm measuring 5.4 x 5.8 cm with peri-aortic haematoma. Despite intense resuscitation, pulseless electrical activity ensued while awaiting for tertiary referral. The presentation of aortic dissection and aneurysm can vary and mimic other deadly diseases in which misdiagnosis can be fatal. Most common neurological manifestations are transient ischaemic attack and ischaemic stroke. POCUS is increasingly used by emergency physician in acute care as it is rapid, non-invasive, widely available and allows accurate measurement of the aorta. Aneurysmal rupture between 4.5 to 5.5 cm is a useful guide for surgical prophylaxis. Intimal flaps visualisation has a sensitivity of 67-80 % and a specificity of 99 - 100 % with demonstration of colour flow in both true and false lumens in Doppler, strengthening the diagnosis of aortic dissection. Clinicians should be aware of the unique presentations of aortic dissection and aneurysm, as both can mimic other serious diseases whereby misdiagnosis can be fatal. In district setting where advanced radiological imaging is not readily available, the utility of POCUS in the ED can be crucial to diagnose aortic dissection and aneurysm.

Introduction

Acute aortic dissection and aneurysm are lethal vascular emergencies involving the aorta. Although, pain is the classical presentation of both dissecting aorta and aneurysm, other myriad of symptoms can be presented by the occlusive dissection of aortic branches, aneurysmal expansion or hypotension [1]. Neurological presentation of aortic emergencies are not only frequent (17-40 % of patients), but often dramatic and may mask the underlying condition [2]. Diagnosis of aortic dissection is missed in up to 38 % of patients on initial assessments with up to 28 % diagnoses being made during post-mortem [3]. Additionally, it can mimic acute ischaemic stroke or myocardial infarction and with increasing use of thrombolytic therapy, misdiagnosis could be fatal [2]. Therefore, point of care ultrasound (POCUS) is crucial for rapid diagnosis of aortic dissection and aneurysm especially in district general hospitals with limited high tech radiology imaging [4].

First Case: Alternating Consciousness associated with Acute Aortic Dissection (DeBakey Type I)

Case Presentation

A 60-year old Chinese gentleman with known case of Hypertension was referred from health clinic for altered mental state with bradycardia. He had an episode of fainting which precipitated by shortness of breath upon climb-

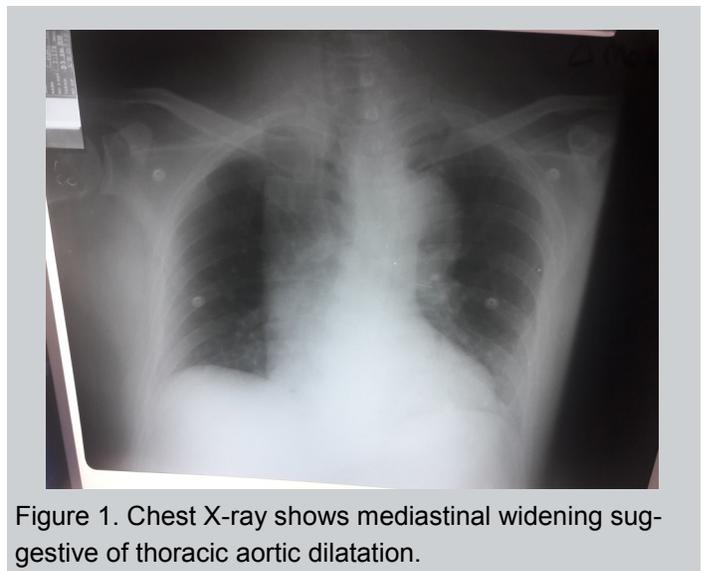


Figure 1. Chest X-ray shows mediastinal widening suggestive of thoracic aortic dilatation.

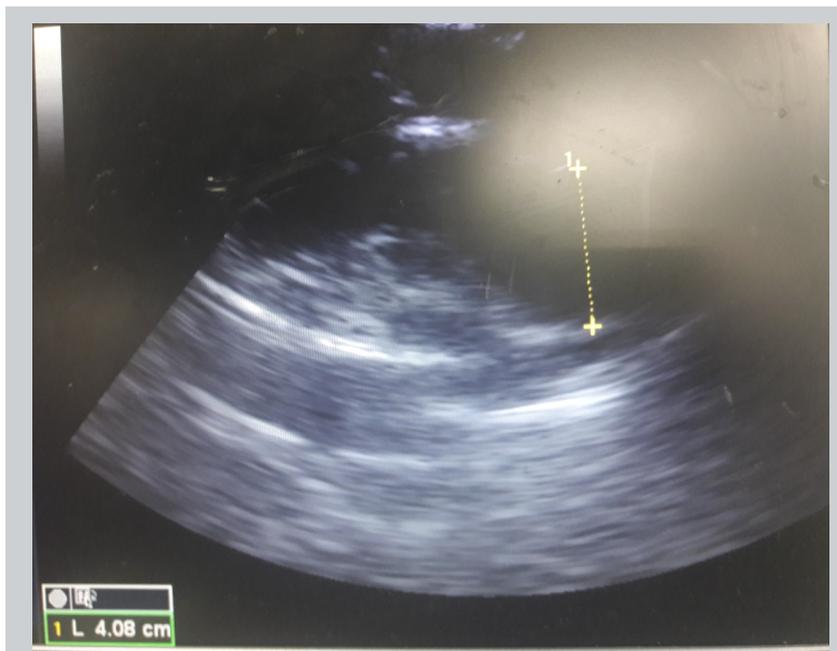


Figure 2. Aortic root measuring 4.08 cm.



Figure 3. Aortic intimal flap seen in apical five chamber view and parasternal short axis view

ing of stairs. On initial presentation, he appeared drowsy and only responded to pain stimuli. Initial Glasgow Coma Scale was E1, V3, M5 and pupils bilaterally 3mm reactive to light. His vital signs demonstrated blood pressure of 86/59 mmHg, heart rate of 60 beats per minute, temperature of 36 Celcius and saturation of 98% under room air. He regained full conscious level when we laid him supine for intubation. Patient began vocalising, complaining of severe tearing chest pain which was not resolved with Morphine and Fentanyl infusion.

On examination, he was diaphoretic and pale. There were radio-radial and radio-femoral delays. His other examination were unremarkable.

His Electrocardiogram demonstrated sinus rhythm without ischaemia changes. Chest X-ray showed marked widened mediastinum and obliteration of aortic knob (Figure 1).

POCUS demonstrated aortic root dilatation measuring four centimetre and aortic intimal flap (Figure 2, Figure 3, Video S1). Rapid infusion of crystalloid normal saline and blood products was performed to restore systolic blood pressure to more than 90mmHg.

Patient was subsequently referred to a tertiary hospital and Computed Tomography Angiogram of Aorta and Carotid Artery revealed extensive Aortic Dissection (DeBakey Type I) with involvement of aortic arch branches, right Innominate Artery, left Common Carotid Artery and left Subclavian Artery. It extended to the Infrarenal

Abdominal Aorta and left Common Iliac Artery. Patient was referred to the vascular team for definitive surgical intervention.

Second Case: Complex Generalised Seizure associated with Ruptured Abdominal Aortic Aneurysm

Case Presentation

A 70-year old Malay gentleman with known case of Hypertension was referred from health clinic for recurrent seizure. This was the second episode of seizure with semiology of generalised tonic-clonic. Previously, he had a similar episode of grand mal seizure and was admitted to inpatient unit, but no further investigation had been done. In the emergency department, he had another episode of tonic-clonic seizure which aborted with diazepam infusion. There was no history of fever or evidence of recent trauma.

On examination, he was unconscious without response to verbal and pain stimuli. His vital signs demonstrated blood pressure of 100/60 mmHg, pulse rate of 60 beats/min and saturation was 98 % under high flow mask. Pupils were bilaterally 4mm and reactive to light. Abdominal examination revealed a faintly palpable, pulsatile mass localized at epigastric and peri-umbilical regions.

Electrocardiogram showed sinus rhythm with no evidence of ischaemia. X-ray of the chest revealed no mediastinal widening. We performed bedside ultrasound showing abdominal aortic aneurysm measuring 5.45 x 5.85 cm

with peri-aortic concealed haematoma (Figure 4). The aneurysm extend to infra-renal without involvement of Common Iliac Artery.

Rapid resuscitation and blood products transfusion were administered in an attempt to maintain circulatory blood pressure while awaiting for tertiary referral. Despite all efforts, pulseless electrical activity ensued and patient passed away due to ruptured aneurysm.

Discussion

Michael Ellis DeBakey (born September 7, 1908), who was the pioneer of the treatment of aortic dissection, was diagnosed with aortic dissection type II and suffered from neurological symptoms. Before he had operation at the Figure 4. Thoracic aortic dissection at arch level with diameter of 4.7 x 4.3 cm with true lumen is seen at the center measuring 4.2 x 1.8 cm and false lumen seen at both sides.

age of 97 years old, he was delirious and sometimes unresponsive [2]. According to a study conducted in Korea, neurological manifestations of aortic dissection were found in 14.7 % of all patients with aortic dissection, and in 21.8 % of patients with type A (deBakey type I) dissection with supra-aortic branches involvement [1].

The most common neurological presentation was ischaemic stroke or transient ischaemic attack (TIA) followed by hypoxic encephalopathy, transient global amnesia, ischaemic neuropathy, spinal cord ischaemia and syndromes, seizure, hoarseness and septic encephalopathy [1,2]. The pathophysiology of cerebral involvement includes dissection of aortic arch vessels, cerebral hypoperfusion with global hypotension and nerve compression by enlarging lumen [2]. Signs and symptoms that mimic spinal cord syndromes is due to obliteration of Arteria Radicularis Magna (Adamkiewicz artery) that supplied the spinal cord [2]. Ruptured abdominal aortic aneurysm is usually presented with severe abdominal pain. However, in up to 15 % of cases, abdominal pain was not the cardinal feature [3]. The reasons behind the painless presentation are not fully understood but a few explanations include cerebral hypoperfusion and systemic hypotension [3].

Aortic dissection has become a challenge for decision-making to thrombolysate a patient presenting with hyperacute ischaemic stroke or myocardial infarction. A literature review revealed three out of four patients who received thrombolytic treatment for acute ischaemic stroke secondary to aortic dissection sustained deadly haemorrhagic complications [1]. Moreover, there are a number of

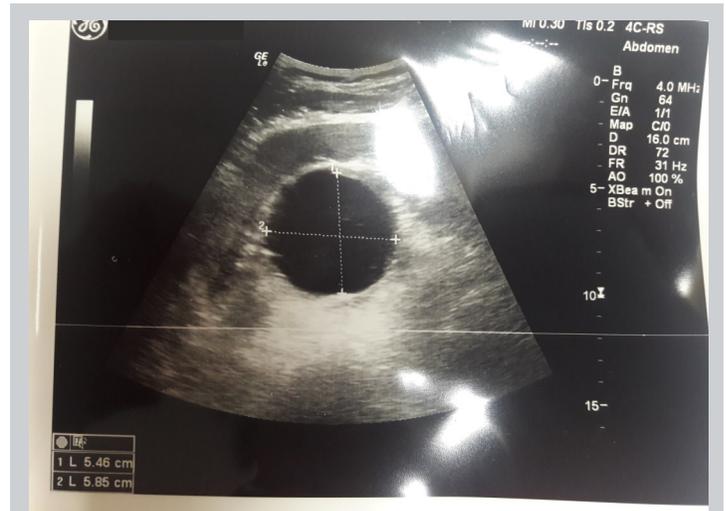


Figure 4. Abdominal aortic aneurysm measuring 5.4 x 5.8 cm with peri-aortic haematoma.

cases of suspected myocardial infarction treated with thrombolysis, complicated by the extension of the dissection into the pericardium leading to cardiac tamponade and death [2].

Various radiological modalities used to evaluate thoracic and abdominal aorta with advantages and limitations in the acute care setting. This includes plain chest X-ray (CXR), computed tomography angiography (CTA), magnetic resonance imaging (MRI), transthoracic echocardiography (TTE), and multi-planar transesophageal echocardiography (TEE) [4]. TTE is increasingly used by emergency physician as a point-of-care (POC) test comparing to other modalities as it is rapid, non-invasive and allows accurate measurement of the aorta. CXR is a poor tool to diagnose aortic dissection because only 10-18 % of aortic dissection demonstrate a widened mediastinum. CXR can be normal in 12-18 % of cases [5]. Although the sensitivity and specificity of CT, TEE and MRI range from 94 - 100 %, they are expensive, not widely available especially at district general hospitals and require removal of potentially unstable patients from the resuscitation zone [6].

In the emergency department, POCUS provides real-time information of unstable diseases at the bedside, concurrently with evaluation of patients and resuscitation. Thus, emergency physicians have been advocated to develop skills to obtain ultrasound images, interpret them and be able to treat patients accordingly [6]. There are numerous studies demonstrating utility of POCUS at the bedside to diagnose aortic dissection and aneurysm. Typically, aneurysmal rupture between 4.5 to 5.5 cm is a useful guide for surgical prophylaxis in an emergency setting in patient

presenting with acute complaints [4]. Intimal flap visualisation has a sensitivity of 67-80% and a specificity of 99 - 100% [5]. The undulating intimal flap is highly specific, and was demonstrated in our case. Other sonographic features may demonstrate colour flow in Doppler flowing in both true and false lumens, strengthening the diagnosis of aortic dissection [5].

Conclusion

Clinicians should be aware of unique presentations of aortic dissection and aneurysm, which can mimic other serious diseases, including neurological emergencies. In district setting where advanced radiological modalities are not readily available, the utility of POCUS in the ED can be crucial to diagnose aortic dissection and aneurysm.

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